

Instantly Available PC

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Agenda

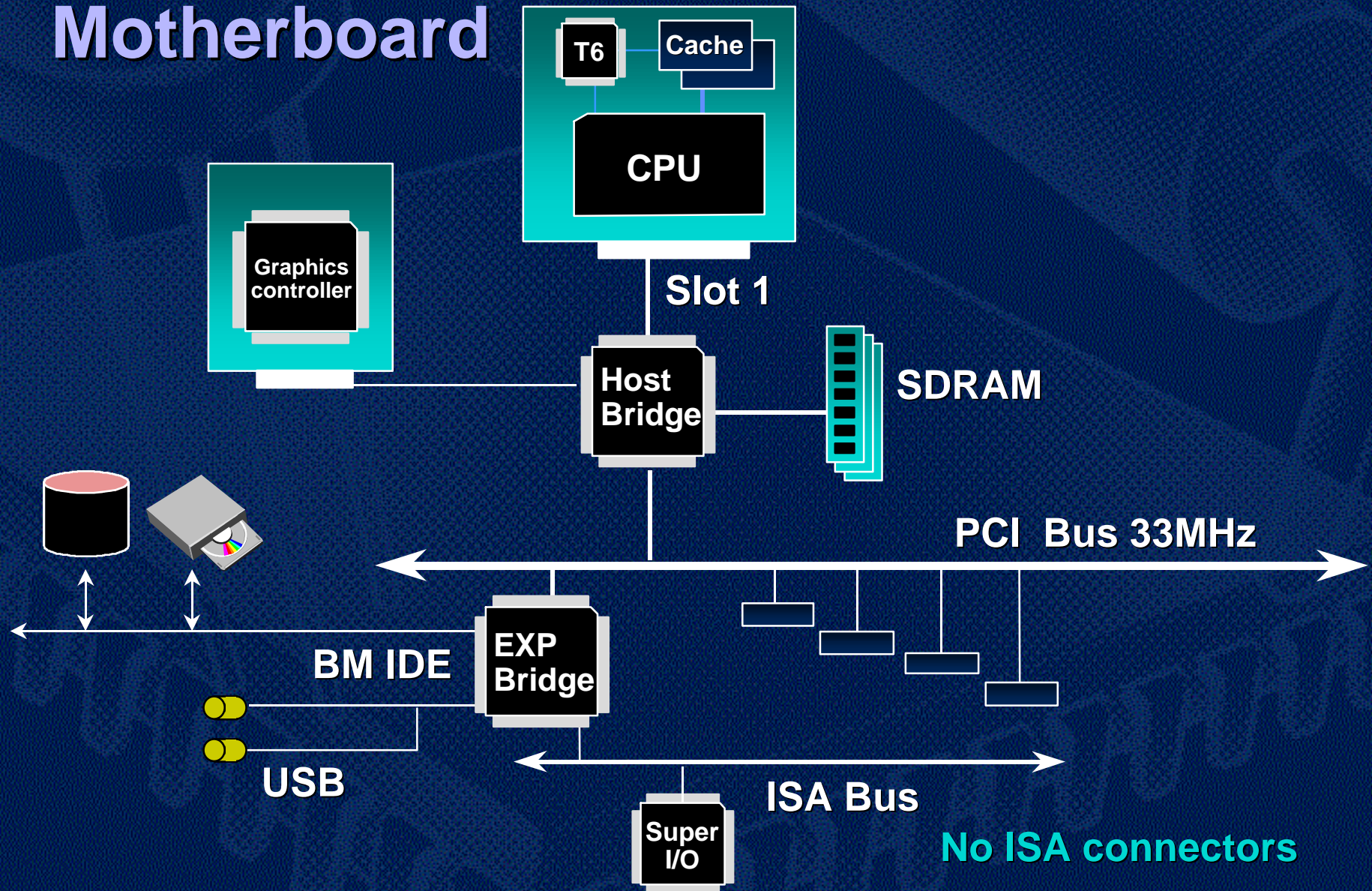
- ◆ Instantly Available PC: overview
- ◆ System ingredients
- ◆ Power delivery recommendations
- ◆ Summary

Instantly Available Features

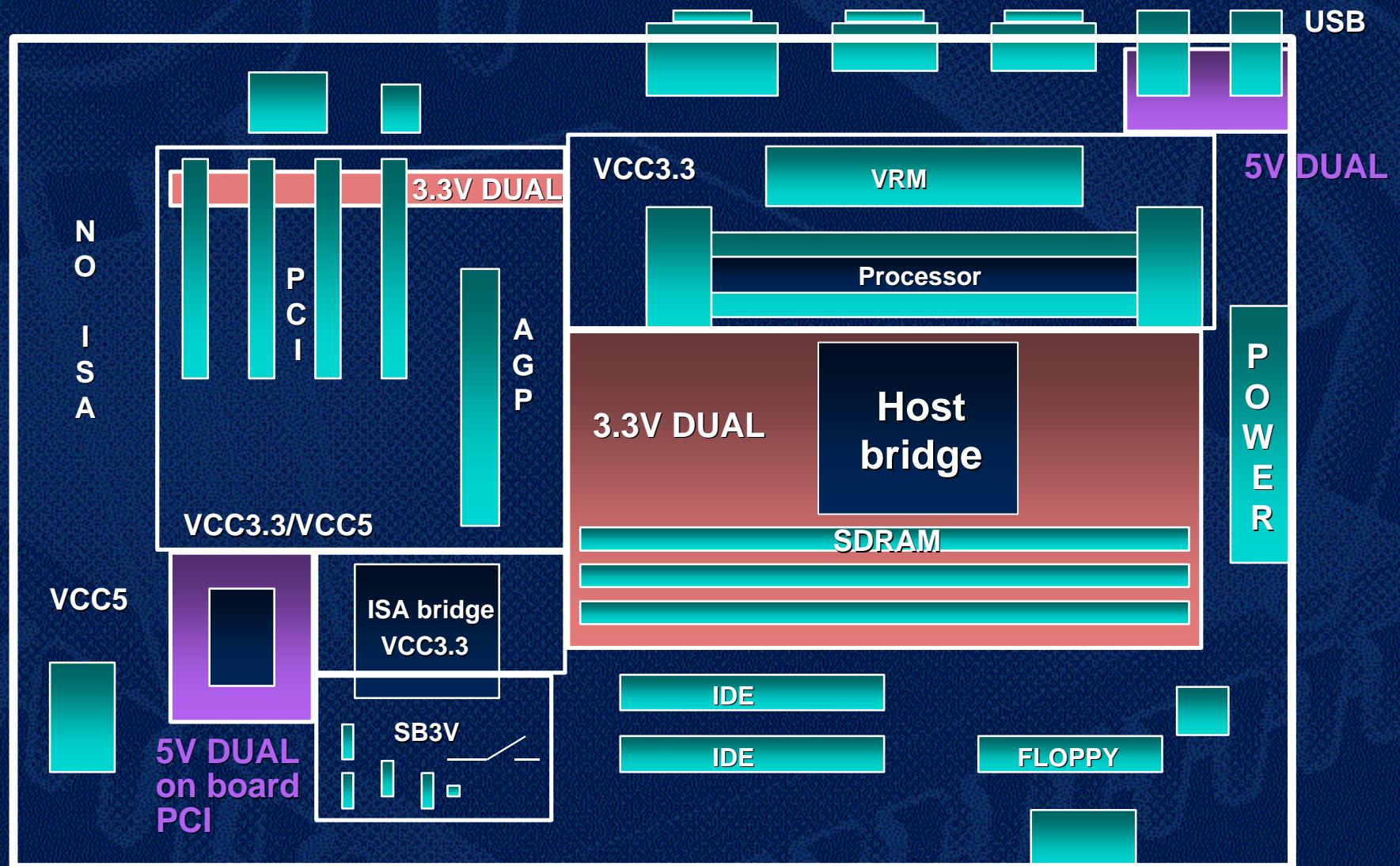
- ◆ **ACPI based operating system power management**
- ◆ **Key power management features**
 - ◆ S3 - Suspend to RAM implementation with split power planes
 - ◆ Sub 5W reduced power consumption in suspend to RAM state
 - ◆ PCI PM (PCI 2.2) with PME# and 3.3V Vaux support
 - ◆ Dual mode power delivery
- ◆ **Thermal control enables quiet operation**
 - ◆ System thermal control
 - ◆ Programmable, variable speed fan operation
- ◆ **Support for “off-yet communicating” LAN and modem devices**

Architectural Overview

Motherboard



PC Platform Power Planes



Careful partitioning needed for low power

Five Watts Considerations

- ◆ Design assumptions
 - ◆ Memory/memory controller powered
 - ◆ PCI wake up device
- ◆ Total system power budget < three watts
 - ◆ System => 0.1 - 0.5 W
 - ◆ DRAM => 0.1 - 0.5 W
 - ◆ Wakeup device PCI spec (0.375 A) - max 1.25 W
- ◆ Dual mode power delivery
 - ◆ Sleep state efficiency is less than 60%

$$\text{Minimum efficiency to achieve 5 watts} = \frac{\text{system power}}{5W}$$

Choose your components wisely

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System Ingredients

- ◆ **Operating systems supporting ACPI**
 - ◆ Windows 98, Windows NT 5.0
- ◆ **Applications**
 - ◆ Should use Win 32 extensions for OnNow
 - ◆ Need testing for proper operation after resume
- ◆ **BIOS**
 - ◆ Supports ACPI 1.0 specification + errata
 - ◆ All major BIOS vendors are engaged

System Ingredients

- ◆ **Modems and LAN adapters**
 - ◆ **Compliant with Device Class PM specification**
 - ◆ **Communication**
 - ◆ **Network**
 - ◆ **Support for new PCI 2.2 specification**
 - ◆ **PME # and 3.3V Vaux to enable PCI PM**
 - ◆ **Support for D3 cold wakeup**
 - ◆ **D3 cold caller ID support in development for modem devices**
 - ◆ **New AT command for caller ID repeat (TIA-695)**
 - ◆ **Pattern filtering support in development for LAN devices**
 - ◆ **Drivers must comply with NDIS 5 specification**

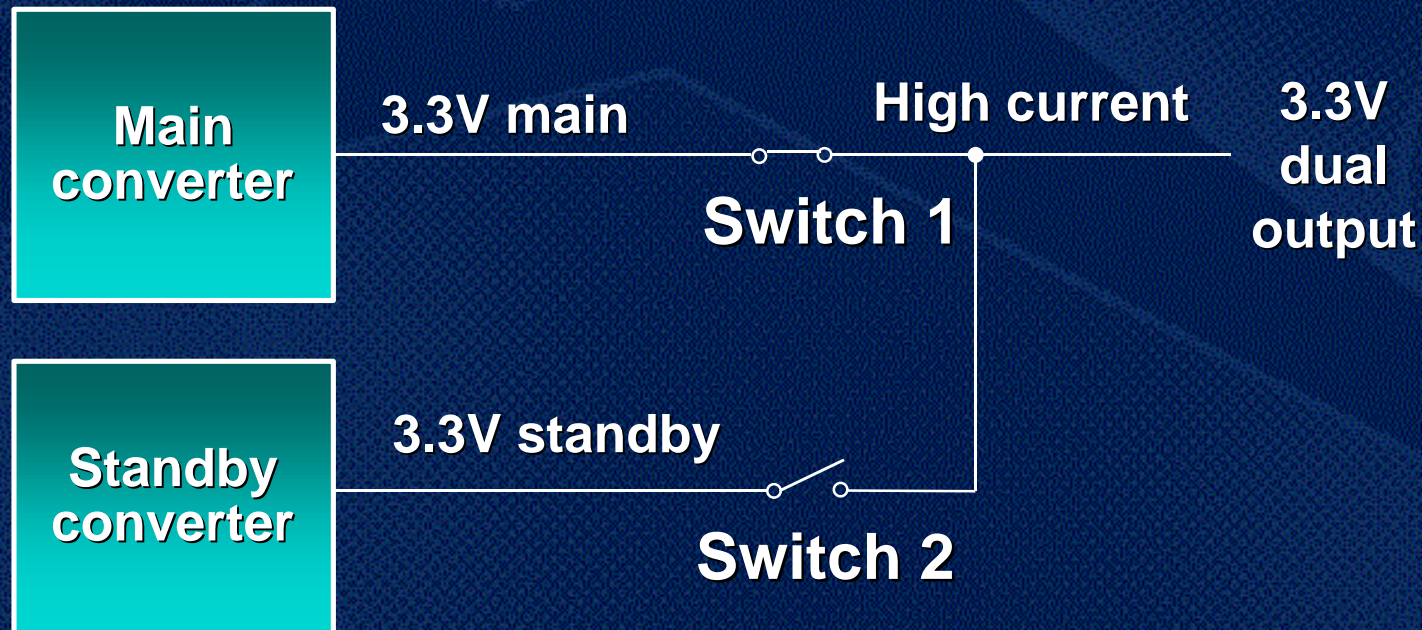
System Ingredients

- ◆ **Graphics and audio adapters**
 - ◆ **Compliant with Display Device Class PM specification**
 - ◆ **Context is lost when entering S3 state**
 - ◆ **Driver must save/restore content**
 - ◆ **Optimize restore speeds**
- ◆ **Dual mode power delivery subsystem**
 - ◆ **Switching circuits on the motherboard**
 - ◆ **Dual mode power supply**
 - ◆ **Three cost options for power delivery subsystem**

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Dual Mode Concept



	Switch 1	Switch 2
Normal operation	Closed	Open
Sleep mode	Open	Closed

Power Delivery Cost Options

	3.3v dual output	5.0v dual output	Supported wakeup devices	Active mode fan control	Efficiency at 3W load	Cost
Good	YES	NO	1 700ma dual capacity	NO* (ON/OFF)	35%	\$1.50 - 2.00
Better	YES	NO	2 (*) 1.2A dual capacity	YES	35%	\$3.00
Best	YES	YES	4 (*) 2A 3.3V dual 1.5A 5V dual	YES	50%	\$4.50

(*) - additional standby power is needed from the power supply
Cannot be done on the MB

Agenda

- ✓ Instantly Available PC: update
- ✓ System design: update
- ✓ Power delivery requirements: update
- ◆ Summary

Call To Action

- ◆ Implement system motherboards with:
 - ◆ Suspend to RAM feature
 - ◆ Support for PCI 2.2 (PME# and 3.3V vaux)
- ◆ Design PCI PM into communication peripherals
- ◆ Download Instantly Available power delivery specification (rev 1.0)
 - ◆ Switching circuits on the motherboard
 - ◆ With dual mode power supply
 - ◆ Cost as low as \$1.5
- ◆ Support Instantly Available architecture in 2H '98, 1H '99 product plans

For More Information

- ◆ **Instantly Available overview**
 - ◆ <http://developer.intel.com/solutions/tech/power.htm>
- ◆ **Instantly Available PC system power delivery specification**
 - ◆ <http://developer.intel.com/design/power/supply98.htm>
- ◆ **Instantly Available design guide**
 - ◆ <http://developer.intel.com/design/power/pcpower.htm>
- ◆ **PCI-PM specification**
 - ◆ <http://www.pcisig.com/current/pcipm/pm10.pdf>
- ◆ **PCI-PM 3.3vaux ECR**
 - ◆ <ftp://download.intel.com/design/power/vauxecr.pdf>
- ◆ **ACPI overview and specification**
 - ◆ <http://www.teleport.com/~acpi/>